

INSTALLING RELIABILITY

A nighttime aerial view of a city, likely Hong Kong, showing a dense cluster of illuminated skyscrapers and buildings. The Victoria Harbour is visible in the center, with lights reflecting on the water. The sky is dark, and the city lights create a vibrant, blue-toned scene.

**Product Update**  
SKYWAN 5G SW Release V1.5

ND SATCOM

## Lead

ND SATCOM's VSAT flagship product SKYWAN 5G is continuously enhanced with new features. Some version history and the feature set is outlined in the table below and further explained in this document:

SW	Release Date	Features
1.3.83 HTS	2017-08-29	HTS / cross-strap, 1+1 and N+M redundancy, Multicast, 16 MF-TDMA channel
1.4.99	2018-04-27	Header Compression, Multi-Master, OpenAMIP antenna interface, outdoor housing, Encryption board, NMS redundancy, NMS Northbound interface, Multi-Language WebUI
1.5.113	2018-11-30	see following sections

## The ONE- Building Block

SKYWAN 5G - THE ONE Mastermind - is the building block and core product of ND SATCOM's VSAT offerings. It comes either as 19" rack version or as board for integration in terminals powered by SKYWAN 5G or as outdoor version. The units can be interconnected to increase inbound capacity (utilize multiple receive channels aka stacking), for hot-standby backup (1+1 / N+M node redundancy) or as part of the DVB-S2X solution.

## SKYWAN 5G Release V1.5

In the scope of the SKYWAN 5G development cycle release V1.5 numerous software and hardware features were implemented. All customers are encouraged to migrate to SW V1.5 to benefit from the new features shown below.

## Communication on the Move (COTM)

SKYWAN 5G already works fine in on the move applications, however optimizations are done to shorten reacquisition of the network after shadowing while in motion (e.g. driving under bridges or through cities) and increase resiliency of the routing table. Measures taken are:

- Static address-resolution entries for COTM terminals. As such the station can immediately start transmission once receive lock is acquired without waiting for dynamic address resolution.
- More robust links with Es/NO down to -2.9 dB.
- TDMA link layer sync loss suppression, thus routing information is preserved during shadowing up to one minute by default (configurable: 60-300s). If loss of clear sight appears longer, the full routing information is rebuilt to confirm its correctness.
- BPSK modulation and Doppler shift compensation.

## Beam Switching

Mobility applications, e.g. ships in global transits or land based vehicles or trains driving greater distances, need effective automatic beam switching technology to remain connected to satellites when moving in and out of a beam. This is especially important with the new generation of high throughput satellites (HTS), as regions of coverage previously captured with relatively few beams – creating one large coverage area per beam – are now moving to many small beams. Covering this, SKYWAN 5G uses a set of pre-configured satellite beam profiles with the definition of its geographical dimension. With the GPS position constantly received from the attached antenna by means of the OpenAMIP protocol, SKYWAN 5G calculates in which beam it is located and when it reaches its edge. At the edge, the modem is probing the new beam first (make before break) and then performs the beam switch over automatically without service interruption.

### SKYWAN 5G

- Multi-Language WebUI
- Multi-Master
- Outdoor Version
- Compression for IP/UDP/TCP and Cellular Networks
- Antenna Signalling
  - OpenAmip (IP protocol)
  - AUX port (electrical): Tx inhibit / Rx lock
- Encryption board
- Shared Amplifier
- 16 Channel MF-TDMA

### NMS

- Multi-Language WebUI
- NMS Redundancy
- Northbound Control & Monitoring MMI
- Topology based routing
- Network overview report
- Visualization of stacked units in home screen
- DVB modulator home screen icon

- COTM optimization
- Beam Switching
- DHCP Server
- Load-balancing over N+1 network nodes / switchover of forwarding stack
- Encryption board: key exchange handshake
- DVB based antenna pointing
- DVB VRF assignment

Outlook R1.6: ACM in MF-TDMA networks

### Architectures

DVB-S2

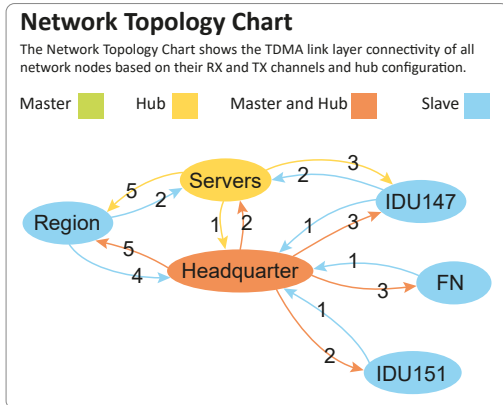
HTS / Cross-Strap / Beam Switching

Stacking / Node Redundancy



## NMS: Topology based routing

The NMS WebUI introduces a network topology chart visualizing the nodes and its TDMA connectivity over satellite and to other nodes. The chart shows the connectivity by frequency channel and type, i.e. full-mesh or star or hybrid connectivity.



As before, there is an auto-generated TDMA IP address used with OSPF for full-mesh connectivity. The NMS VRF service is extended to support multiple IP addresses for a node's satellite (TDMA) interface. The VRF service supports an IP subnet strategy to map the TDMA link layer topology to the multiple IP addresses used in the OSPF routing protocol for meshed or point-to-point links. As such OSPF can be operated for any topology without static routes.

## Operator Convenience / Ease of Use

Extensions in the WebUI introduce further automation of recurring tasks for network monitoring and troubleshooting:

- Network status reports: a set of key performance indicators for all stations is displayed in a table and can be exported as well (csv or XML) for further processing.
- Visualization of the DVB modulator and stacked units in home screen:

**DVB Modulators**  
DVB-GW\_1, DVB-GW\_2

**Devices**  
View: Large Icons

Device	Channel	Status
Hub A SID 1	cid-10 nc 1	Active
	cid-20 td 3	Active
	cid-30 td 4	Broken
	cid-40 b	Active
	cid-50 ncb	Active
Remote B SID 2	cid-10 nc 1	Active
	cid-20 td 2	Active
	cid-30 b	Active
Remote C SID 3	cid-10 nc 1	Active
	cid-20 td 2	Active
	cid-30 td 3	Active

- Troubleshooting report package: the NMS provides a download of all relevant log files, configuration data and dashboard statistics in a single compressed file. The same function is made available in the SKYWAN 5G WebUI which compresses the log files, the configuration and a set of operational values in a single file.

## DHCP Server

DHCP (Dynamic Host Configuration Protocol, RFC 2131) is a network management protocol used to dynamically assign an Internet Protocol (IP) address to any device on a network so they can communicate using IP. DHCP automates and centrally manages these configurations rather than requiring network administrators to manually assign IP addresses to all network devices. Based on the IP address configuration in the NMS VRF service, the operator can easily define IP address ranges which are then maintained locally by the SKYWAN 5G DHCP server.

**DHCP Server**  
Here you can configure the settings for the DHCP Server.

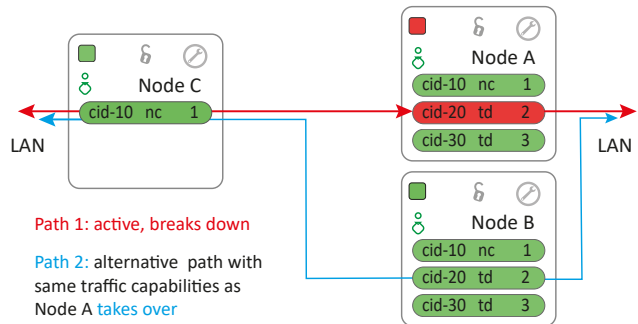
**VRF and Device**  
 VRF: global  
 Device: FN  
 VLAN ID: 100  
 Address: 10.10.12.1/24

**DHCP Server Settings**  
 Enable:   
 Low Address:   
 High Address:

**Gateways**  
 Gateway 1: 10.10.12.1  
 Gateway 2:   
 Gateway 3:   
 Gateway 4:

## Load Balancing with Redundant Nodes

For highly redundant configurations used e.g. in ATC environments, the traffic path decision is extended from a pure routing decision to consider traffic capabilities of a node as well.



## Encryption Key Exchange Handshake

Key management for the optional internal encryption module (E-11B16272) is extended to automatically generate and ex-

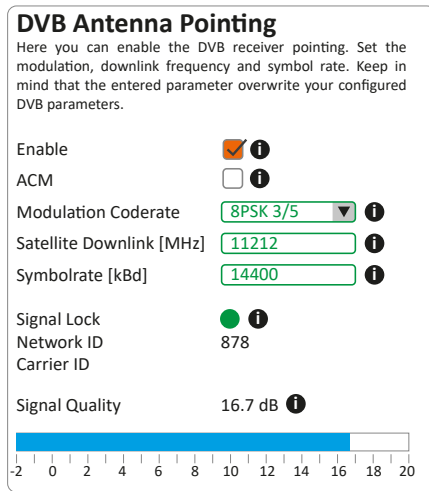
**Encryption Service**  
Here you can configure the encryption service within your network in order to encrypt network traffic. Note that all devices used within the encryption service must be equipped with the same encryption engine.

**Service Parameters**  
 Enabled:   
 Backplane: PCIe  
 Multicast:   
 Encrypt Local Management:   
 Key Type: Automatic  
 Curve: C2pnb 304w1

change AES-keys with next network commit.

### DVB Based Antenna Pointing

In addition to pointing and peaking based on the TDMA signal, the internal DVB receiver can now be used for pointing on a TDM signal as well.



### DVB Outbound VRF assignment

DVB user traffic is always assigned to a VRF which is now configurable to one out of VRF 1 to VRF 8.

### Outlook for ACM in TDMA

This feature is planned for R1.6.

All information in this guide has been prepared with great care. ND SATCOM, however, does not accept liability for possible errors, changes and/or omissions. This technical application guide is for information purposes only and aims to support you in tackling the complexity and taking full advantage of all potential the technology has to offer. Please check [www.ndsatcom.com](http://www.ndsatcom.com) or contact your sales partner for further information.

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